





Citations**: "**"Nuclear Power History." *ThinkQuest*. Oracle Foundation. Web. 30 Mar. 2012.<http://library.thinkquest.org/17658/nuc/nuchistoryht.html>."Nuclear Winter: Now Easier to Trigger than Ever (In Short: We'd Be F#%^ed)." *TreeHugger*. Web. 30 Mar. 2012.<http://www.treehugger.com/clean-technology/nuclear-winter-now-easier-to-trigger-than-ever-in-short-wed-be-fed.html>."Time for Change." *Pros and Cons of Nuclear Power*. Web. 03 Apr. 2012. <http://timeforchange.org/pros-and-cons-of-nuclear-power-and-sustainability>."How Does a Nuclear Power Plant Generate Electricity?" *Yahoo! Answers*. Yahoo! Web. 05 Apr. 2012. <http://answers.yahoo.com/question/index?qid=20080611200937AAjPjXE>.Web. 5 Apr. 2012. <http://www.solarpowernotes.com/non-renewable-energy/how-nuclear-power-plant-work.jpg>.*Green world investor*. N.p., 05 A. Web. 11 Apr 2012. <http://www.greenworldinvestor.com/2011/04/05/uses-of-nuclear-power-nuclear-transport-shipssubmarinesagriculturehuman-healthelectricityfuturistic-applications/>.

Nuclear power can be used for many things other than producing energy for the world. Organizations have begun to create technology that can increase food production, improve availability and quality, reduce production costs, and minimize pollution of crops. A common use of nuclear energy is in the treatment of cancer called radiotherapy. Radioisotope tracers are used to detect levels of toxic substances in food, air, and water. Nuclear energy can also be used to industries for processing and sterilizing certain products by means of radiation.

#### Other Applications for Nuclear Power

Other Interesting facts

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**Nuclear Energy**

6-Mannon

# History

During the 1680's a gunpowder explosion was used to heat water. Jean de Hautefeuille tried to up water, and Dutch astronomer Christian Huygens tried a piston in a cylinder. These experiments were the beginnings of a nuclear power-like process. Superheated steam was produced in an experiment by Jacob Perkins in 1823. His experiment was called a flash boiler. Steam of this type is later used in nuclear power plants to turn the steam turbine. Between 1900 to the present, turbine technology improved. Although uncontained nuclear waste is a biohazard; if the nuclear process had been discovered before 1890, in modern times, cars may have been powered by nuclear power because it is the same simple process as the engines by Diesel, Daimler, and Benz! December 2, 1942, Enrico Fermi achieves a controlled nuclear chain reaction with a demonstration reactor, called the Chicago Pile 1. December 20, 1951, experimental reactor produces first energy from a nuclear reaction, enough to light four light bulbs. January, 1955, the Atomic Energy Commission begins program of funding for nuclear power plants between government and industry. In 1956, the first nuclear power station was built in December 2, 1957, in Shippingport, Pennsylvania, the first full scale nuclear power plant goes into service. April 3, 1965 the first nuclear reactor is operated from outer space. 1973, American utilities buy 41 nuclear power plants. January, 1983 President Reagan signs the Nuclear Waste Policy Act. Hydro power was surpassed by nuclear power in total electrical generation in 1984. December 1993, the total number of nuclear power plants in the United States is 109, collectively producing 610 billion kWhs of electricity.

# Advantages and Disadvantages

**Advantages:** Nuclear power generation does allow relatively low amounts of carbon dioxide. The emissions of greenhouse gases and therefore the contribution of nuclear power plants to global warming is therefore relatively little. This technology is readily available; it does not have to be developed first. It is possible to generate a high amount of electrical energy in one single plant. **Disadvantages:** The problem of radioactive waste is still an unsolved one. The waste from nuclear energy is extremely dangerous and it has to be carefully looked after for several thousand years (10'000 years according to United States Environmental Protection Agency standards). High risks: Despite a generally high security standard, accidents can still happen. It is technically impossible to build a plant with 100% security. A small probability of failure will always last. The consequences of an accident would be absolutely devastating both for human being as for the nature. The more nuclear power plants (and nuclear waste storage shelters) are built, the higher is the probability of a disastrous failure somewhere in the world. Nuclear power plants as well as nuclear waste could be preferred targets for terrorist attacks. No atomic energy plant in the worldcould withstand an attack similar to 9/11 in New York. Such a terrorist act would have catastrophiceffects for the whole world. During the operation of nuclear power plants, radioactive waste is produced, which in turn can be used for the production of nuclear weapons. In addition, the same know-how used to design nuclear power plants can to a certain extent be used to build nuclear weapons (nuclear proliferation). The energy source for nuclear energy is Uranium. Uranium is a scarce resource; its supply is estimated to last only for the next 30 to 60 years depending on the actual demand. The time frame needed for formalities, planning and building of a new nuclear power generation plant is in the range of 20 to 30 years in the western democracies. In other words: It is an illusion to build new nuclear power plants in a short time.

# How it works

Fuel rods are made out of a radioactive material dependent on the type of reactor it is installed in. The fuel rods' natural decay releases neutrons that, when the reactor is shutdown, are absorbed by the control rods. The control rods are made of a material that has a high cross-section for the absorption of neutrons such as hafnium. As the control rods are raised more fuel is exposed to more neutrons. The neutrons are absorbed by the atoms of fuel causing that atom to become unstable and fission. Three things happen at this point to produce usable energy: 1-Heat is released by the fissioning of the fuel and heats the reactor coolant (water), 2-A lot of neutrons are released to collide with the reactor coolant transferring the neutron's kinetic energy to the H2O., 3-The resulting fission daughters (Cesium, Krypton, Xenon and others) from the splitting of the fuel have short half-lives and their decay creates heat. The released neutrons from fission created more fission. For commercial reactors the control rods are now used to control the rate of fission such that the flow of coolant through the reactor keeps the fuel at an operable temperature. The coolant transfers the heat to a Steam Generator (heat exchanger that allows the boiling of the water on the non-radioactive side of the heat cycle). The steam is then directed to a Turbine Generator and power is sent to the grid.